

the improver comprising a nitrated C<sub>1</sub>-C<sub>4</sub> ester of a fatty acid, wherein the ester is derived from a naturally occurring triglyceride having at least one carbon-carbon double bond;

the process comprising the steps of

epoxidizing said double bond to form an epoxide,

reacting said epoxide in an alcohol forming reaction to form at least one secondary alcohol, and

nitrating the secondary alcohol to form a nitrate.

~~at least one nitrate group attached to at least one secondary carbon of the ester.~~

30.(previously added) (canceled)

31.(previously added, currently amended) The ~~cetane improver~~process of claim 29, wherein the alcohol forming reaction ~~nitration~~ is accomplished by methoxylating the epoxide ~~on~~ of at least one double bond of the fatty acid and subsequent ~~nitration of the secondary alcohols.~~

32.(previously added, currently amended) The ~~cetane improver~~process of claim 29, wherein the alcohol forming reaction ~~nitration~~ is accomplished by hydrati~~hydrating the epoxide~~ ~~on~~ of at least one double bond of the fatty acid and subsequent ~~nitration of the secondary alcohols.~~

33.(previously added, currently amended) The ~~cetane improver~~process of claim 29, wherein the ester is formed by a process including the hydrolysis of vegetable oil followed by esterification of fatty acids formed by the hydrolysis.

34.(previously added, currently amended) The ~~cetane improver~~process of claim 29, wherein the ester is formed by the transesterification of vegetable oil.

35.(previously added, currently amended) The ~~cetane improver~~process of claim 29, wherein the cetane improver is an additive for diesel fuel.

36.(previously added) (canceled)

37.(previously added, currently amended) A process for the production of a cetane improver,

the improver comprising a nitrated triglyceride, the nitrated triglyceride being derived from a naturally occurring triglyceride; having at least one carbon-carbon double bond,

the process comprising the steps of

epoxidizing said double bond to form an epoxide,

reacting said epoxide in an alcohol forming reaction to form at least one secondary alcohol, and

nitrating the secondary alcohol to form a nitrate, and ~~at least one nitrate group attached to at least one secondary carbon of the~~ ~~nitrated triglyceride.~~

38.(previously added) (canceled)

39.(previously added, currently amended) The ~~cetane improver~~process of claim 37, wherein the ~~nitration~~alcohol forming reaction is accomplished by methoxylating the epoxide~~methoxylation of at least one double bond of the fatty acid and subsequent nitration of the secondary alcohols.~~

40..(previously added, currently amended) The cetane improver of claim 37, wherein the ~~nitration~~alcohol forming reaction is accomplished by hydrating the epoxide~~on of at least one double bond of the fatty acid and subsequent nitration of the secondary alcohols.~~

41..(previously added) (canceled)

42.(previously added) (canceled)

43.(previously added, currently amended) The ~~cetane improver~~process of claim 37, wherein the cetane improver is an additive for diesel fuel.

44-56.(previously added) (canceled)

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## **RESPONSE**

Reconsideration of the present application respectfully is requested. Claims 1-28, 30, 36, 38, 41, 42, and 44-56 have been cancelled. Claims 29, 31-35, 37, 39-40, and 43 are pending. No new matter has been added to the present application. Claims 29-56 are believed to be in condition for allowance and such favorable action respectfully is requested.

### **Claim Rejections – 35 U.S.C. § 112**

Claims 1-28 were rejected under 35 U.S.C. § 112, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants have cancelled claims 1-28. As such, Applicant requests withdrawal of the §112 rejection and other possible rejections of these claims.

Applicant has cancelled claims 30, 36, 38, 41, 42, and 44-56. As such, Applicant requests withdrawal of the §103(a) rejection and other possible rejections of these claims.

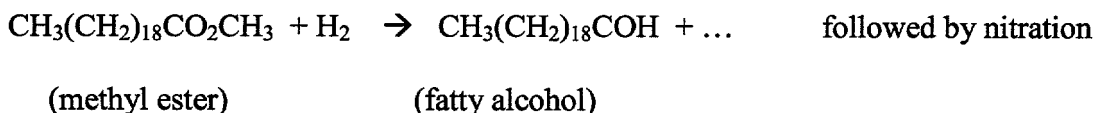
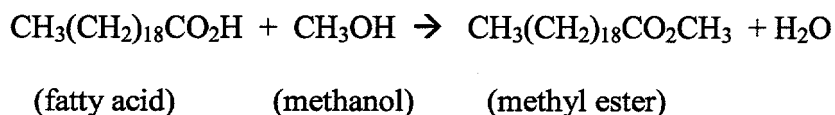
### **Claim Rejections - 35 U.S.C. §103(a)**

Claims 29-46 have been rejected under 35 U.S.C. § 103(a) Per Office Action of 3/26/03, Page 2, Last Full Paragraph stating “the same reasons set forth pages 4-6..” of your previous Office Action of 6/02/02. Per your Office Action of 6/02/02, Page 5, Lines 1-2 stating “Patentee further teaches a process for esterification of the fatty acids produced by hydrolysis, column 4, lines 19-35.” Applicant responds as follows:

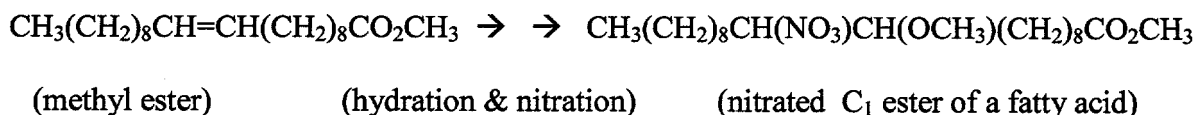
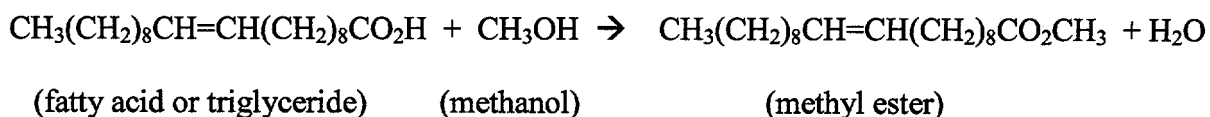
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*Poirier et al DOES NOT teach a process based on "HYDROLYSIS". The text of Poirier et al was searched for the following terms: HYDRATION, HYDROLYSIS, and EPOXIDATION. None of these terms were used in the specification of Poirier et al.*

*Poirier et al SPECIFICALLY teaches a process based on "HYDROGENATION". Poirier et al teaches esterification with methanol; HOWEVER, this methyl ester is destroyed in the subsequent "HYDROGENATION" as taught by Poirier et al. Poirier et al did this:*



*By example, the Applicants perform the following as described in the specifications:*



Poirier et al may have a methyl ester INTERMEDIATE, but the final product is a primary nitrate referred to as a "fatty alcohol nitrate ester". Specifically, the final product of Poirier et al is not a nitrated C<sub>1</sub>-C<sub>4</sub> ester of a fatty acid proposed in our Claim 29. None of the products taught or

suggested by Poirier et al were nitrated C<sub>1</sub>-C<sub>4</sub> esters of a fatty acid. Specifically, the final product of Poirier et al is not a nitrated triglyceride as proposed in our Claim 37. Specifically, the reaction of Poirier et al does not include epoxidation, hydration, or methoxylation of the carbon-carbon double bonds of the fatty acid. Specifically, the patent of Poirier et al does not incorporate epoxidation, hydration, or methoxylation reactions. Specifically the “fatty alcohol nitrate ester” of Poirier et al contain primary nitrates (a primary nitrate is attached to a carbon where the carbonss are only attached to one other carbon) while the nitrates claimed by the applicants are secondary nitrates (a secondary nitrate is attached to a carbon where the carbon is attached to two other carbons). Advantages of the Applicant’s approach over the approach of Poirier et al are summarized in the Applicants’ patent application. Applicants traverse the rejection.

#### **Claim Rejections - 35 U.S.C. §112**

Claims 29 and 37 have been rejected under 35 U.S.C. § 112 Per Office Action of 3/26/03 as containing new subject matter. Independent claims 29 and 37 have been amended to remove the term “secondary nitrate” cited as being new subject matter. As such, Applicant requests withdrawal of the §112 rejection based on these amendments. Claims 31-35, 39-40, and 43 are pending and as dependent on amended claims 29 and 37 contain no new subject matter. .As such, Applicant requests withdrawal of the §112 rejection based on these amendments.

Claims 31-34, 39-40 have been rejected under 35 U.S.C. § 112 Per Office Action of 3/26/03 as being indefinite or failing to point out and distinctly claim the subject matter. These claims now depend on amended independent claims 29 and 37, which now are process claims and as such the amended claims 31-34, 39-40 now distinctly claim subject matter as related to

process specification. As such, Applicant requests withdrawal of the §112 rejection based on these amendments.

There are two amended independent claims in the present application. Independent claim 29 recites a process for the production of a cetane improver, the improver comprising a nitrated C<sub>1</sub>-C<sub>4</sub> ester of a fatty acid, wherein the ester is derived from a naturally occurring triglyceride. Independent Claim 37 recites a cetane improver, the improver comprising a nitrated triglyceride of a fatty acid, wherein the ester is derived from a naturally occurring triglyceride. Both Claims 29 and 37 include process steps distinctly different than those directly or indirectly indicated by prior art.

The specification of the present application discloses that C=C functional groups are targeted for nitration. (See Specification Page 5, last paragraph; page 6, first paragraph; page 7, last paragraph; page 8, first paragraph) Attached to Paper No. 8 dated December 10, 2002, is a declaration under 37 C.F.R. § 1.132 of William Sutterlin, a Process Chemist with Chem Char of Columbia, Missouri and a PhD candidate at the University of Missouri-Columbia, stating the advantages of the present invention in targeting the C=C functional groups of fats and oils include the formation of at least one nitrate group on at least one secondary carbon of a C<sub>1</sub>-C<sub>4</sub> ester or triglyceride of a fatty acid. A C<sub>1</sub>-C<sub>4</sub> ester or triglyceride of a fatty acid having at least one nitrate group on at least one secondary carbon has improved cetane, solubility, detergency and lubricity.

The Poirier reference neither teaches nor suggests a nitrated C<sub>1</sub>-C<sub>4</sub> ester of a fatty acid with at least one nitrate group attached to at least one secondary carbon of the ester or triglyceride of a fatty acid with at least one nitrate group attached to at least one secondary carbon of the triglyceride. Also, the Poirier reference neither teaches nor suggests the use of

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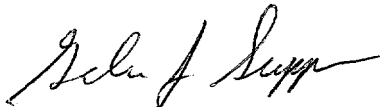
epoxide chemistry to epoxidize the carbon-carbon bonds of unsaturated fatty acids with subsequent hydration or methoxylation to allow nitration to form a secondary alcohol. Rather, the Poirier reference teaches fatty alcohol nitrate esters having nitrate groups attached to the primary carbons of the fatty alcohol nitrate esters, not the secondary carbons. (See Column 4, lines 40-50). The fatty alcohol nitrate esters of the Poirier reference with nitrate groups attached to a primary carbon are long chain nitrates with limited effectiveness as cetane improvers and poor solubility. As the Poirier reference neither teaches nor suggests a nitrated C<sub>1</sub>-C<sub>4</sub> ester or triglyceride of a fatty acid having at least one nitrate group attached to at least one secondary carbon of the ester or triglyceride nor does the Poirier reference teach or suggest processing to modify the carbon-carbon double bonds to introduce nitrate functionality, it is requested that the §112 and the §103(a) rejections be withdrawn.

Independent claims 29 and 37 do not specify recommended temperature and pressure ranges. No prior art has been located using the process steps of claims 29 and 37, and so, these claims are written based on processing to achieve the indicated reaction and are not restricted to any temperatures or pressures. Temperatures and pressures useful for the indicated processing are in the specification. Illustrative example 8 of the specification states that "The same method applied to fatty acid methyl esters may be applied to triglycerides." While the emphasis of the specification is on C<sub>1</sub>-C<sub>4</sub> esters of a fatty acids, the specification also includes similar approaches to triglycerides.

Claims 29, 31-35, 37, 39-40, and 43 are believed to be novel and non-obvious in view of the prior art. Applicants submit that the application as amended is in condition for allowance and requests that a time notice of allowance be issued for this case. Should any unresolved

issues remain in this case, please feel free to contact the undersigned at the telephone number listed below.

Respectfully submitted,



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